

PULSES



DRY BEANS

Ingredients and Applications

Dry beans come in a variety of colors and sizes. Beans are found around the world, originating in several different locations. The common bean (*Phaseolus*), including kidney, pinto, navy, lima and others, originates in South America, the Andes and central America. Sub-tropical beans such as adzuki, mung and blackeye peas (*Vigna*) originated in Africa, while broad beans such as fava/faba beans (*Vicia faba*) are thought to have originated in the Fertile Crescent region.



Adzuki



Black



Blackeye Peas



Kidney
Dark Red



Kidney
Light Red



Great
Northern



Navy



Pinto



Fava



Small Red



Mung



Lima



Cranberry

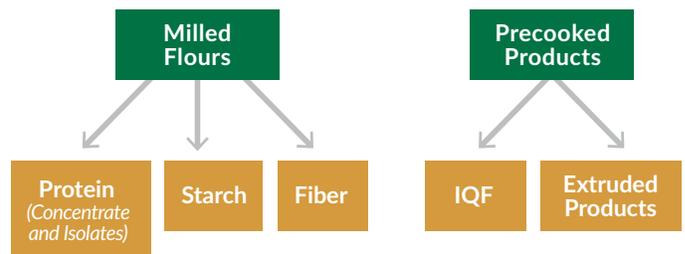


Pink

PROCESSING

Beans are treated similarly to other pulses like peas, lentils and chickpeas. Beans must be soaked prior to cooking. Common methods for cooking beans include canning, pressure cooking, or adding beans to soups. Add any acidic ingredients or those containing calcium or salt after beans have finished cooking, as these can prevent beans from becoming tender while cooking. While adding a small amount of baking soda to cooking water can help beans tenderize more quickly, in excess it negatively affects the flavor of beans and can destroy B-vitamins.

Value Added Bean Products



FLOUR

Dry beans can be milled into flour just like dry peas, lentils and chickpeas. White bean, black bean, and fava bean flours are currently used for gluten-free baking. In a study conducted at Northern Crops Institute, great northern bean flour was used to fortify control bread at 30% and increased the water from 66% in the control to 74% with added bean flour. Differences between raw and pre-gelatinized flours are flavor and functionalities and come from heat processing before milling. Bean flour is mostly available as a whole flour and in pre-gelatinized form.

- **Raw (whole)**

Anti-nutritive factors in bean flour such as polyphenols, phytic acid and trypsin inhibitors, and color and flavor can limit the use of bean flour as an ingredient in bakery products, meat products and snack foods. Legumes can be treated to reduce the content of these anti-nutritive factors, to improve the nutritional value of the protein and remove their bean flavor. Hull of beans are tightly adhered to cotyledons, thus difficult to be removed. Therefore, available bean flour in the market is mostly made from whole beans.

- **Pre-gelatinized (whole)**

Treating raw pulse flour by heating partially gelatinizes the starches, inactivates enzymes, increases shelf life and improves flavor. These attributes make pre-gelatinized pulse flour favorable to raw pulse flour. The differences in gelatinization temperatures among flours from different pulses are attributed to differences in size, form, distribution of starch granules in the flours and to the internal arrangement of starch within the granule. Pregel bean flour serves as an effective flavor carrier and flavor improver, ideal for making more nutritious flatbreads, tortillas, pita breads, crackers, cookies, energy bars and extruded snacks. It also enhances dough yield, firmness and texture.

EXTRUSION

Extrusion is a mechanical process in which materials are forced, under pressure, through a die opening to create products of a desired shape, size and/or texture. Due to its processing flexibility, extrusion cooking produces an incredibly broad range of food products in the cereal, dairy, bakery and confection industries. Pulse flours are often used as the basis for formulations that are extruded in low pressure systems. The flour is often mixed with starchy ingredients, like rice flour, to increase a starch level which enables ideal expansion. Extruded pulse-based products offer a crunchy texture, usually in the form of snacks and breakfast cereals, in a variety of shapes. Extrusion also can be used to produce pre-gelatinized flour by milling the extrusion overs back into flour.

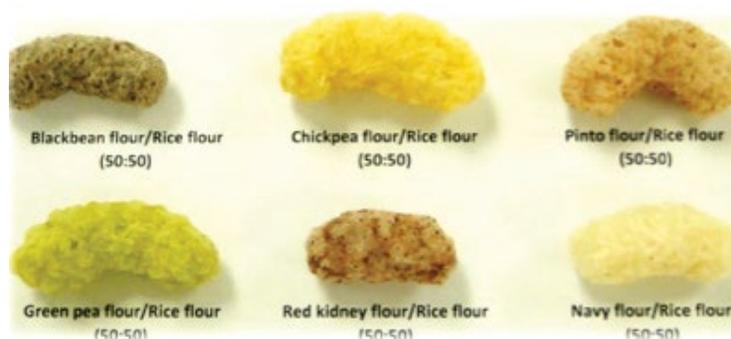


Photo: Northern Pulse Growers Association

BAKING

The majority of the commercially available bean flour is pre-gelatinized, which makes it suitable for baking application. Wide varieties of bean flour enable the manufacturers to experiment with different types of beans for different baked goods. For example, when used in neutral flavored products such as vanilla cakes, white bean or navy bean flour is a good choice. On the other hand, black beans are favorable when used in brownies and chocolate cakes. Apart from the color, the neutral flavor of bean flour provides advantages as an ingredient.

FRACTIONATION

Starch, protein and fiber can be fractionated in the same manner as pea fractionated products. However, because the outer hull of beans is harder to remove than some other pulses (like dry peas and lentils), some fractionations from beans are less common, like fiber, while others are more common, like bean starch, which can be used to make noodles. This affects the commercial applications and products available.

< *Red Bean, Black Bean Extruded Products*

Photo: Northern Pulse Growers Association

TIP: *Applications determine which flour to use. Know the application!*



For more information, contact: **USA Dry Pea and Lentil Council/ American Pulse Association**
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